CLAIMS

What is claimed is:

1. A system for butt welding two expansion joint rails with a control system, wherein each expansion joint rail comprises at least one gland cavity having a fixed distance from the top of each expansion joint rail, said system having a welding shoe assembly comprising:

at least one gland shoe configured to occupy said at least one gland cavity; and

a pair of butt shoes that abut said expansion joint rail and said at least one gland shoe.

2. The system of claim 1 wherein said at least one gland shoe is composed primarily of copper.

3. The system of claim 2 wherein said plurality of butt shoes are composed primarily of copper.

4. The system of claim 1 wherein each gland cavity is occupied by a top gland shoe and a bottom gland shoe.

5. The system of claim 4 wherein said top gland shoe and said bottom gland shoe are beveled.

6. The system of claim 4 wherein said top gland shoe and said bottom gland shoe slidably interface with one another.

7. The system of claim 1 wherein said at least one gland shoe is water cooled.

8. The system of claim 1 wherein said at least one gland shoe comprises a distal portion that occupies said gland cavity and said at least one gland shoe has a flat face that interfaces with one of said butt shoes.

9. A system for butt welding two expansion joint rails with a welding system, wherein each expansion joint rail includes at least one gland cavity that is a fixed distance from the top of each expansion joint rail, said welding system comprising:

a control system which controls a wire feeder;

a modular component systems that interfaces with said control system, said modular component system comprises a weld torch which receives at least one welding wire from said wire feeder; and

a welding shoe assembly configured to contain melted weld material between said expansion joint rails.

10. The system of claim 9 wherein said welding system is an electroslag welding system in which said control system controls flux addition.

11. The system of claim 9 wherein said welding shoe assembly further comprises,

at least one gland shoe configured to occupy said at least one gland cavity; and

a plurality of butt shoes that abut said expansion joint rail and said at least one gland shoe.

12. The system of claim 11 wherein said at least one gland shoe and said plurality of butt shoes are both composed primarily of copper.

13. The system of claim 11 wherein said at least one gland shoe is water cooled.

14. The system of claim 11 wherein said at least one gland shoe comprises a distal portion that occupies said gland cavity and said at least one gland shoe has a flat face that interfaces with one said butt shoes.

15. A method for butt welding two expansion joint rails, wherein each expansion joint rail comprises two gland cavities that are disposed on opposite sides of said expansion joint rail, said method comprising:

defining a weld cavity with,

a first weld face associated with one end of a first expansion joint rail;

a second weld face associated with one end of second expansion joint rail,

a plurality of gland shoes configured to occupy each gland cavity,

a plurality of butt shoes on opposite ends of said weld cavity, wherein each butt shoe abuts each expansion joint rail and abuts each of said gland shoe;

welding said two expansion joint rails with a welding system having a control system; and

removing said plurality of gland shoes and said plurality of butt shoes.

16. The method claim 15 wherein said welding system is an electroslag welding system.

17. The method of claim 15 wherein said control system controls a wire feeder.

18. The system of claim 15 wherein said control system controls flux addition.

19. The system of claim 18 wherein said control system controls a power supply.

20. An expansion joint rail having two gland cavities wherein each gland cavity is a fixed distance from the top of said expansion joint rail, comprising:

a first portion of said expansion joint rail comprised of a parent material welded to a second portion of said expansion joint rail that is also comprised of said parent material; and

a weld material used to weld said first portion of said expansion joint rail to said second portion of said expansion joint rail wherein said weld material is generated with a welding system having a control system.

21. The expansion joint rail of claim 20 wherein said weld material is generated using an electroslag welding system.

22. The method of claim 20 wherein said control system controls a wire feeder and a power supply.

23. The expansion joint rail of claim 20 wherein said weld material is generated with a welding system selected from a group consisting of a submerged arc welding system, a shielded metal arc welding system, a flux core arc welding system, and an electrogas welding system.

24. A system for welding a expansion joint rail to a support beam, said expansion joint rail is disposed on horizontal axis and has a distal face, a first face having a gland cavity, a second face opposite said first face having another gland cavity, and a weld face, said support beam is disposed on vertical axis, said system comprising:

an angled torch adapter coupled to a welding torch that receives at least one welding wire from a wire feeder; and

an angled consumable guide tube that feeds said at least welding wire into a weld cavity defined by said weld face of said expansion joint rail and a support beam face.

25. The system of claim 24 wherein said welding system is an electroslag welding system.

26. The system of claim 24 wherein said welding system further comprises a control system that controls a wire feeder.

27. A method for welding a expansion joint rail to a support beam comprising:

placing said expansion joint rail on a horizontal axis, said expansion joint rail having a distal face, a first face adjacent said distal face having a gland cavity, a second face opposite said first face having another gland cavity, and a weld face;

placing said support beam on a vertical axis;

clamping a modular component system to said expansion joint rail, said modular component system comprising a welding torch that receives at least one welding wire from a wire feeder;

controlling said modular component system with a control system configured to control said wire feeder;

defining a weld cavity with said expansion joint rail weld face, said support beam, and a pair of welding shoes; and

welding said expansion joint rail to said support beam.

28. The method of claim 27 wherein said welding said expansion joint rail to said support beam further comprises feeding said at least one welding wire into said weld cavity.

29. The method of claim 28 wherein said at least one welding wire is fed into said weld cavity using a consumable guide tube.

30. The method of claim 29 wherein said modular component system is configured to generate an electroslag weld.

31. A welding shoe assembly for butt welding two expansion joint rails wherein each expansion joint rail comprises at least one gland cavity having a fixed distance from the top of each expansion joint rail, said welding shoe assembly, comprising:

at least one gland shoe configured to occupy said at least one gland cavity; and

a pair of butt shoes that abut said expansion joint rail and said at least one gland shoe.

32. The welding shoe assembly of claim 31 wherein said at least one gland shoe is composed primarily of copper.

33. The welding shoe assembly of claim 32 wherein said plurality of butt shoes are composed primarily of copper.

34. The welding shoe assembly of claim 31 wherein each gland cavity is occupied by a top gland shoe and a bottom gland shoe.

35. The welding shoe assembly of claim 34 wherein said top gland shoe and said bottom gland shoe are beveled.

36. The welding shoe assembly of claim 34 wherein said top gland shoe and said bottom gland shoe slidably interface with one another.

37. The welding shoe assembly of claim 31 wherein said at least one gland shoe is water cooled.

38. The welding shoe assembly of claim 31 wherein said at least one gland shoe comprises a distal portion that occupies said gland cavity and said at least one gland shoe has a flat face that interfaces with one of said butt shoes.